SECTION 07550

MODIFIED BITUMINOUS MEMBRANE ROOFING (SBS)

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LANL MASTER CONSTRUCTION SPECIFICATION

When editing to suit project, author shall add job-specific requirements and delete only those portions that in no way apply to the activity (e.g., a component that does not apply). To seek a variance from applicable requirements, contact the ESM Architectural POC.

When assembling a specification package, include applicable specifications from all divisions, especially Division 1, General Requirements.

Delete information within “stars” during editing.

Specification developed for ML-3 / ML-4 projects. For ML-1 / ML-2, additional requirements and QA reviews are required.

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PART 1 GENERAL

1.1 SECTION INCLUDES

A. Membrane roofing, sub-base, adhesives, board insulation, separation board, flashing, and accessories.

1.2 RELATED SECTIONS

A. COMPLY WITH SECTION 07300, ROOFING GENERAL PROVISIONS.

1.3 SYSTEM DESCRIPTION

A. MODIFIED BITUMEN CAP SHEET SYSTEM

1. Poly ISO insulation 4 foot by 4 foot panels hot mopped , 1 inch Polyisocyanurate insulation per design and Section 07212

2. Gypsum roof board 1/2 inch FR 4 foot by 4 foot panels hot mopped, fully adhered in asphalt,

3. Base-ply sheet SBS (2-plys) hot mopped, Modified Bitumen, 60 mil, poly reinforced, fully adhered with asphalt and installed in shingle fashion,

4. Cap-sheet SBS hot mopped, 180 mil granular modified bitumen sheet, polyester reinforced.

1.4 WEATHER RESTRICTIONS

A. Do not install membrane or roofing system during periods of low ambient temperatures below 30 degrees F.

B. Material installation during periods of high ambient temperatures greater than 90 degrees F requires special consideration to prevent condensation on the membrane surface and work with excessively fast adhesive drying times.

C. Do not install when moisture is present on the deck or the substrate to which applying.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

A. Alternate products may be accepted; follow Section 01630, PRODUCT OPTIONS AND SUBSTITUTION.

2.2 ACCEPTABLE MANUFACTURERS OF MEMBRANE MATERIAL

A. Firestone Roofing

B. GAF Materials Corporation

C. GAF./US Intec

D. Garland Co., Inc.

E. Johns Manville Corporation

F. Soprema, Inc.

G. Tremco, Inc.

Note: NO SUBSTITUTIONS FOR THE MANUFACTURERS IDENTIFIED ABOVE WILL BE PERMITTED.

2.3 MEMBRANE AND ASSOCIATED MATERIALS

A. Ply Materials: Tough smooth surfaced styrene butadiene styrene (SBS) modified asphalt glass reinforce sheet shall meet or exceed the following physical properties when tested in accordance with ASTM D 6163 Type I Grade S:

Thickness	1.54 (60 mils)
Weight	95 lbs./roll
Roll Dimensions	39.4 inches by 49.1 feet
Tensile Strength, 0 degrees F, (MD/XD)	74 lbf/in
Elongation (Max load), 0 degrees F, (MD/XD)	5 percent
Tear Strength, 0 degrees F, (MD/XD)	95 lbf
Low Temperature Flexibility	Pass -5 degrees F
Dimensional Stability	<0.5%

Compound Stability 220 degrees F

B. SBS Cap sheet and base flashing:

Material Property	**Testing Standard**	**Typical Values**
Tensile Strength at 77°degree F	ASTM D2523	129MD 87XD
Elongation	ASTM D412	34MD 29XD
Asbestos Content	EPA 600/MA-82-020	0%
Fire Resistance	ASTM E108	Class A
Thickness	ASTM D5147	160 mil (4nun)
Impact Resistance	ASTM D3746	40mm max
Reinforcing Core		180 gni/m 2 polyester

2.4 GYPSUM HARD BOARD

A. Comply with section 07821

2.5 ADESIVES AND PRIMERS

A. Asphalt bitumen: ASTM D 312 Type III or IV.

B. Adhesive as approved by membrane manufacturer.

2.6 MANUFACTURER'S – INSULATION

A. Comply with section 07212.

B. As approved by membrane manufacturer

2.7 WOOD NAILERS

A. Wood Material:

1. Solid Blocking: Pressure treated wood, #2 Grade or better, nominal 2 inch by 4 inch minimum.

2. Shim Material: Pressure treated plywood, 1/2 inch by width to match solid blocking.

2.8 MEMBRANE FLASHING MATERIALS

A. Per membrane manufacturer's installation instructions.

2.9 ROOF SURFACING

A. White granular SBS cap sheet.

2.10 RELATED MATERIALS

A. Mechanical fasteners

1. Standard Roofing Fastener: Alloy steel fastener with CR-10 coating with a .220 inch diameter thread, Factory Mutual Standard 4470 Approved, #3 Phillips truss head or hex head, Drill-Tec™ Fasteners, by BMCA.

B. Prefabricated Expansion Joint Covers: Roof expansion joint covers are factory fabricated assemblies used to accommodate three-dimensional joints in a roof structure. Two standard sizes to accommodate most common joint widths. Standard 50-foot continuous length minimizes joints, universal style suitable for both field and wall expansion joint in both flat-mounted and curb-mounted styles. Made of 0.045 inch thick reinforced membrane with foam-supported bellows, heat welds directly to roofing membrane. Equipped with metal nailing flanges and membrane welding flaps.

C. One-part Polyurethane Sealant suitable for sealing upper lip of exposed termination bars and around upper edge of penetration clamping rings, meets or exceeds ASTM C-920-87, Type S, Grade NS, Class 25.

D. Water Block: One part butyl based high viscosity sealant suitable for sealing between flashing membrane and substrate surface behind exposed termination bars and for sealing between roofing membrane and drain flange.

E. 2-Part Pourable Sealant: 100 percent solids epoxy based two-part sealant suitable for filling sealant pans at irregularly shaped penetrations. Epoxy is part A. Poylamide is part B.

F. Lip Termination Bar: Extruded aluminum termination bar with angled lip caulk receiver and lower leg bulb stiffener. Pre-punched slotted holes a 6 inch or 8 inch centers. 3/4 inch by 10 inch with 0.090 inch cross section.

G. Walkway Pads: Per manufacturers approved installation instructions and placed where necessary to protect the roof membrane.

H. Modified Bitumen: Other related materials as recommended by manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that the surfaces and site conditions are ready to receive work.

B. Verify that the deck is supported and secured.

C. Verify that the deck is cleaned and smooth, free of depressions, waves, or projections, and properly sloped to drains, valleys, eaves, scuppers or gutters.

D. Verify that the deck surfaces are dry and free of ice or snow.

E. Verify that all roof openings, curbs, pipes, sleeves, ducts, vents or other penetrations through the roof are solidly set, and that all flashings, tapered edges and cant stripes, reglets, and wood nailers are secure and tight to the building as per this specification.

F. The beginning of installation of the roof system signifies the contractor accept the existing conditions as being in compliance with the requirements of this specifications.

3.2 PROTECTION

A. Protect any adjacent building surfaces against damage from the installation of the roofing system.

B. The contractor shall observe all safety precautions as recommended by Single Ply Roofing Institute (SPRI) and the National Roofing Contractors Association (NRCA).

C. All debris from the roofing operations shall be removed from the roof deck and jobsite and disposed at an approved, suitable disposal site.

3.3 PREPARATION OF THE DECK

A. METAL DECK

1. Wood nailers of equivalent thickness to the roof insulation must be provided at perimeter and projection openings to act as an insulation stop and to provide nail-holding capability for the nailing flanges of metal flashing.

3.4 BITUMEN

A. For mopping ply sheets, insulation or SBS membrane.

1. Do not mix different types of asphalt.

B. Use only an ASTM D 312, Type III or Type IV Steep Asphalt. Type III asphalt may be used on slopes up to 1/2 inch per foot Type IV asphalt must be used on all slopes greater than 1/2 inch per foot.

C. Discontinue application of asphalt over any substrate where foaming of asphalt is observed.

D. Application with hot asphalt requires continuous, uniform interplay mopping rates of 25 lbs. plus or minus 20 percent per 100 square feet of roof area. Too little asphalt may result in voids, while too much asphalt can result in membrane slippage.

E. When applying base or interplay sheets, the point of application temperature of the asphalt must be at the Equiviscous Temperature (EVT) with a tolerance of plus or minus 25 degrees F, at which a viscosity of 125 centipoise is attainted. When using mechanical asphalt applicators, the target viscosity should be 75 centipoise.

F. The equiviscous temperature (EVT) for the asphalt can be found on the asphalt cartons or bills of lading.

G. For substrates that absorb asphalt, apply the asphalt in sufficient quantity to assure the level of adhesion specified.

H. Asphalt application shall not commence when the outside temperatures is below 45 degrees F unless cold weather application instructions such as using insulated piping and luggers to maintain the required asphalt temperature at the point of application and using products stored above 55 degrees F for at least 24 hours prior to installation.

I. The operator of the roofing bitumen kettle shall be fully trained and familiar with its safe operation and have the required safety equipment and clothing for his protection.

J. Under no circumstances shall the roofing bitumen kettle be left unattended while operating.

K. Accurate thermometers to check temperatures at the kettle and point of application are required.

L. Do not heat the asphalt to or above its flash point.

M. Do not hold the asphalt at temperatures above the finished blowing temperature for more than 4 hours.

N. Do not keep heated tankers above 325 degrees F overnight or weekends. The roofing bitumen kettle shall be placed a safe distance from the building up on plywood or a tarp to facilitate easy clean up.

3.5 INSULATION APPLICATION

A. General:

1. Do not apply roof insulation and roofing until all other work trades have completed jobs that require them to traverse the deck on foot or with equipment. A vapor retarder (membrane type) coated lightly with asphalt may be applied to protect the inside of the structure before the insulation and final roofing are installed. Before the application of the insulation.

2. Do not install wet damaged or warped insulation boards.

3. Install insulation boards with staggered board joints in one direction (unless taping joint).

4. Install insulation board snug. Gap between board joints must not exceed 1/4 inch. All gaps in excess of 1/4 inch must be filled with like insulation material.

5. Do not kick insulation boards into place.

6. Install insulation boards per insulation board manufacturer's requirements.

7. Edges of insulation board shall be mitered and filled at ridges and elsewhere to prevent open joints or irregular surfaces. Avoid breaking or crushing of the insulation at the corners.

8. For steep slope roof application, if insulation is to be installed, mechanically attach insulation or mop between wood nailers.

B. Polyisocyanurate Roof Insulation

1. The roof deck shall be smooth, dry, clean, and free of sharp projections and depressions, all wood nailers shall be the same thickness as the insulation.

2. Do not install wet, damaged or warped insulation boards.

3. Set the insulation with long joints continuous. The short joints shall be staggered (over wood boards the long edge of insulation board shall be placed at right angles to the wood boards). Insulation shall be installed with coated side up.

4. Set the insulation with long joints continuous. The short joints shall be staggered. Insulation shall be installed with coated side up.

5. Insulation thickness shall be uniform over common roof areas.

6. Boards shall be tightly butted against each other but shall not be kicked into position. Boards shall be cut to fit neatly against adjoining surfaces.

7. Insulation shall not be applied under damp or wet conditions with excessive wind conditions, or unless the ambient temperature is at least 45 degrees F and rising.

8. Insulation must not be left exposed to the weather. No more insulation shall be applied than can be completely covered with the finished roof per day.

9. It is recommended that the insulation be set in more than one layer when total insulation thickness will exceed 2.5 inches. Additional layers of insulation shall be installed with the joints staggered in one direction, assuring that board ends and sides touch all along their length. Press each board firmly in place. Stagger the joints of each additional layer by as much as possible in relation to the insulation joints in the layer(s) below to eliminate continuous vertical gaps.

10. A minimum FMRC 1-90 attachment is recommended. Refer to FMRC Approval Guide for FM Fastening patterns. Factory Mutual requires fastener density increase in perimeter and corner areas for FM 1-90 or greater. Refer to FM Loss Prevention Data Sheets 1-28, 1-29 and 1-49.

3.6 WOOD NAILERS

A. Wood nailers must be 3.5 inches minimum width or 1 inch wider than metal flange and minimum 1 inch thick and securely fastened to the deck.

B. Wood nailers must be pressure treated and have water based preservatives. Petroleum or creosote base preservatives are not recommended because of possible incompatibility with asphalt-based products.

C. Wood nailers are required at all eaves, gable ends, penetrations or wherever metal flanges must be incorporated into the roof system.

D. Nailers must be mechanically fastened to the deck.

E. Wood nailers shall be the sane thickness as tapered edge strip or insulation.

F. For roof systems requiring perimeter venting, nailers shall be slotted.

3.7 INTER-PLY SHEET APPLICATION

A. Roof Membrane – Two Ply

1. The surface over which the membrane is to be installed shall be in accordance with this specification.

2. Membrane sheet application: Install first sheet on the in half width sheets, lapping 4 inches on the sides and 6 inches on ends. Stagger adjacent end laps a minimum of 18 inches apart. All side and end laps must be staggered from underlying plies. Follow first course with a full width sheet of. Install the second sheet of roof membrane and starting at the low point of the roof and progressing to the high point. Install full width sheets, lapping 4 inches on the sides and 6 inches on ends. Stagger adjacent end laps a minimum of 18 inches apart. All side and end laps must be staggered from underlying piles. Side laps shall not coincide in multiple layer applications.

3. The coiled membrane shall be un-rolled, placed upside down and allowed “relax” prior to installation then re-rolled to apply. Care should be taken to insure that the cap sheet lays flat in the asphalt. There must be complete adhesion between the cap sheet and the mopping asphalt. Brooming-in may be necessary under certain conditions to insure that the cap sheet adheres solidly to the asphalt. Apply sufficient asphalt to avoid creating open channels where three or more membranes are lapped.

4. A minimum 3/8 inch asphalt flow-out must be obtained at all laps. Dry laps are not acceptable. Check all seams for full and uniform adhesion. Un-adhered seams must be lifted with a heated trowel and resealed with Matrix 201 System Pro SBS flashing cement.

5. The asphalt temperature at point of application must be maintained at the asphalt’s EVT or 425 degrees F whichever is greater; with a rolling band of mopping asphalt across the full width of the roll.

6. All end laps must be staggered a minimum of 18 inches so that no adjacent end laps coincide. If end laps fall in line or are not staggered the proper distance, a full width of smooth membrane must be installed over the end laps.

7. All laps must be parallel or perpendicular to the slope of the roof such that the flow is never against the lap.

8. SBS membranes must not be applied during adverse weather or without precautionary measures in temperatures below 45 degrees F.

9. In cold weather, remove rolls from the heated storage only as they are being installed. Install membrane rolls immediately after removal from storage to avoid membrane cooling. Modified rolls must be at least 45 degrees F.

10. The use of insulated asphalt handling equipment is recommended in cold weather.

11. Mopping must not precede the roll by more than five feet.

12. If night stops or water cutoffs are needed at the end of the day's work, they must be made of waterproof membrane and applied with hot asphalt or cold adhesive. Before restarting the job, all stops and cutoffs shall be cut out and completely removed.

3.8 CAP SHEET INSTALLATION

A. SBS Cap Sheet

1. Install according to manufacture's approved installation instructions.

3.9 FLASHING

A. General:

1. All penetrations should be at least 2 feet from the curbs, walls, and edges to provide an adequate space for proper flashing.

2. Flash all perimeter, curb, and penetration conditions with metal, membrane flashing, and flashing accessories as appropriate to the site condition.

B. SMB Modified Bitumen System

1. Base flashing: Same material as weathering sheet.

2. Penetration Flashings: Pre-manufactured penetration seals, cartwheel flashing using weathering sheet, or a polyester, or fiberglass mesh reinforced five course flashing using rubber modified plastic cement.

3.10 ACCESSORIES AND RELATED MATERIALS

A. Standard Roofing Fasteners

1. A minimum FMRC 1-90 attachment is recommended. Refer to FMRC Approval Guide for FM Fastening patterns. Factory Mutual requires fastener density increases in perimeter and corner areas for FM 1-90 or greater. Refer to FM Loss Prevention Data Sheets 1-28, 1-29 and 1-49.

CAUTION: Electric or any other conduits should be located in decks, and/or walls.

B. Sealant Pans

1. Flash irregularly shaped penetrations with flanged sealant pans formed of metal, secured to deck, through the membrane with screws 6 inches on center, a minimum of two per side.

2. Strip in metal flanges with 8 inch wide membrane flashing strips, heat weld to both the roof membrane and the metal flanges.

3. Fill sealant pans with 2-part pourable sealant. Alternatively, fill sealant pans with non-shrink quickset grout, and top off sealant pans with a 2 inch minimum thickness of 2-part pourable sealant.

C. Expansion Joints

1. Install prefabricated expansion joint covers at all flat type and raised cant/curb type expansion joint conditions. All metal nailing strips must either be nailed to pressure-treated wood nailers, cants, curbs, or secured to walls with screws or expansion anchors appropriate to substrate type. Weld membrane flaps to roofing/flashing membrane following curb-flashing instructions.

2. Roof membrane must be mechanically attached along the base of raised cant/curb expansion joints with screws and plates a minimum of 12 inches on center.

3. Expansion joint bellows must be twice the width of the expansion joint opening to allow for proper expansion/contraction.

3.11 CLEANING

A. Remove bituminous markings and other contaminants from finished surfaces.

B. In areas where finished surfaces are soiled by asphalt or any other source of soiling caused by work of this or other sections, consult manufacture of surfaces for cleaning advice and conform to those instructions.

3.12 COMPLETION

A. Prior to demobilization from the site, the work shall be reviewed by the LANL SME and Contractor. All defects or non-compliance with these specifications or the recommendations of the membrane manufacturer shall be itemized in a punch list. These items must be corrected immediately by the Contractor prior to demobilization to the satisfaction of the LANL SME and the membrane manufacturer.

END OF SECTION

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Do not delete the following reference information:

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FOR LANL USE ONLY

This project specification is based on LANL Master Construction Specification Rev 1, dated September 2, 2004.